C16/13/989

HE 20.3152:

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The National Cancer Institute (NCI) has prepared this booklet to help you understand more about cancer. The material presented here is intended to add to information from doctors, nurses, and other members of the health care team. This is the first in a series of booklets about cancer, and it contains general information about this disease. It tells you:

- What cancer is;
- What signs you can watch for;
- What to do if you find something;
- How cancer is diagnosed;
- How cancer is treated;
- How you can deal with cancer if it affects you, your family, or your friends; and
- How you can lower your risk of getting cancer.

Throughout this booklet, words that may be new to readers are printed in italics and explained briefly. You will find definitions of these and other terms related to cancer on page 27. For some words, a "sounds-like" spelling is also given.

On page 36, you will find information about how to order other free NCI publications about specific types of cancers, their treatment, and living with the disease, along with the toll-free telephone number for the NCI-supported Cancer Information Service (CIS). The CIS provides information about cancer and cancer-related resources to patients, their families, and the general public.

Our knowledge about cancer is increasing. Research sponsored by the NCI and other groups has led to better methods for preventing, diagnosing, and treating cancer. It offers hope that in the future fewer people will get cancer and even more patients with cancer will be treated successfully.

What Is Cancer?

Cancer is really a group of diseases. There are more than 100 different types of cancer, but they all are a disease of some of the body's cells.

Healthy cells that make up the body's tissues grow, divide, and replace themselves in an orderly way. This process keeps the body in good repair. Sometimes, however, normal cells lose their ability to limit and direct their growth. They divide too rapidly and grow without any order. Too much tissue is produced and *tumors* begin to form. Tumors can be either *benign* or *malignant*.

- Benign tumors are not cancer. They do not spread to other parts of the body and they are seldom a threat to life. Often, benign tumors can be removed by surgery, and they are not likely to return.
- Malignant tumors are cancer. They can invade and destroy nearby tissue and organs. Cancer cells also can spread, or *metastasize*, to other parts of the body, and form new tumors.

Because cancer can spread, it is important for the doctor to find out as early as possible if a tumor is present and if it is

cancer. As soon as a diagnosis is made, treatment can begin.

Signs and Symptoms of Cancer

Cancer and other illnesses often cause a number of problems you can watch for. The most common warning signs of cancer are:

- Change in bowel or bladder habits;
- A sore that does not heal;
- Unusual bleeding or discharge;
- Thickening or lump in the breast or elsewhere;
- Indigestion or difficulty swallowing;
- Obvious change in a wart or mole;
- Nagging cough or hoarseness.

These signs and symptoms can be caused by cancer or by a number of other problems. They are *not* a sure sign of cancer. However, it is important to see a doctor if any problem lasts as long as 2 weeks. Don't wait for symptoms to become painful; pain is not an early sign of cancer.

Early Detection

Any illness should be diagnosed and treated as early as possible, but this is especially important for cancer. The earlier cancer is detected and treated, the better a person's chances for a full recovery.

Besides being alert to symptoms of cancer, both women and men should have regular physical exams. Early detection of some cancers is possible with tests for

individuals who have no symptoms of disease. Even before symptoms appear, a doctor may be able to detect cancers of the *colon, rectum,* mouth, skin, breast, *cervix, prostate,* and *testicles.*

Exams for Both Women and Men

Colon and Rectum

Regular medical exams are important for early detection of cancer of the colon and rectum. To check the rectal area, the doctor inserts a gloved finger into the rectum and gently feels for any bumps.

Beginning at age 50, each person should have an annual test to see if there is blood in the *stool.* Blood in the stool may be caused by colon cancer, but it also can come from other conditions. Further tests are needed to make a definite diagnosis. Every 3 to 5 years after a person reaches 50, the doctor should use an instrument, such as a *sigmoidoscope,* to look at the patient's rectum and colon.

Mouth

It also is important to check regularly for signs of cancer of the mouth. Tissue changes in the mouth that might signal the early beginnings of cancer can be seen and felt easily. A dentist should perform a thorough exam of a patient's mouth at regular visits. In addition, each month you should examine your own mouth using a mirror. Look for changes in the color of the gums, lips, or cheeks, as well as scabs, cracks, sores, swelling, bleeding, or thickenings in any area of the mouth. Finding these or other problems in the mouth does not always mean that cancer is present, but all problems should be checked by a doctor or a dentist.

Skin

Skin cancer is the most common type of cancer in the United States. You should check yourself regularly for new growths or other changes in the skin. Any changes should be reported to the doctor without delay. Doctors should also look at the skin during routine medical exams.

Exams for Women

Breast

All women should have their breasts examined regularly by a doctor to check for any unusual changes, such as a lump or thickening. In addition, women should learn how to perform breast self-examination (BSE) and should do BSE each month. BSE is best done a few days after the menstrual period has ended, when the breasts are least likely to be swollen or tender. After *menopause*, a woman should choose the same day each month for BSE. This examination is especially important for women over 40 because the risk of breast cancer increases with age.

If a women finds a lump or notices a change in her breast, she should see her doctor. About 80 percent of all breast lumps are not cancer, but only a doctor can make a definite diagnosis.

A *mammogram*, an x-ray of the breast, can show a tumor or change in the breast that is too small to be felt—even by a doctor's careful exam. Beginning at age 40, a woman should have a mammogram every 1 to 2 years. When a woman reaches 50, she should have a mammogram every year.

Cervix
Most cases of cervical cancer could be prevented if all women had regular *pelvic* exams and *Pap tests.* In a pelvic exam, the doctor feels the *uterus, vagina, ovaries,* fallopian tubes, *bladder,* and rectum for any abnormality in their size or shape. The Pap test can detect abnormal cells in and around the cervix. For this test, a sample of cells is collected from the upper vagina and cervix with a cotton swab or a wooden scraper and placed on a glass slide for examination under a microscope.

Women should start having annual Pap tests when they turn 18 or soon after they become sexually active. If a woman has had three or more normal annual Pap tests, the test may be done less frequently, based on the advice of her doctor.

Exams for Men

Prostate
A digital rectal examination is the most reliable way for a doctor to detect early prostate cancer. This exam should be part of the annual medical checkup for all men over 40. The doctor may be able to feel an irregular or unusually firm area in the prostate that might mean that a tumor is present.

Testicles
Most testicular cancers are found by men themselves. Men can detect changes in their testicles by doing testicular self-examination (TSE) each month. This simple exam is best done during or after a warm shower or bath when the *scrotum* is relaxed and changes are easy to feel. If TSE reveals a lump or other problem (especially enlargement of the testicles, unusual tenderness, pain, or a feeling of heaviness), a man

should see his doctor. An exam of the testicles by the doctor should also be part of a man's routine annual medical checkup.

Diagnosing Cancer

When symptoms suggest that a person might have cancer, the doctor asks about the patient's medical history and does a complete exam. In addition to checking the general signs of health (temperature, pulse, blood pressure, and so on) the doctor usually does several other tests.

The most common way that doctors explore what's happening inside the body is with *x-rays*. In addition to standard x-rays, like those used to look inside the chest or to check for broken bones, special x-rays may be used to diagnose cancers and other diseases. One of these, the CT (*computed tomography*) scan, uses a computer to produce a cross-sectional picture of the body on a screen. Doctors also use *angiograms* to see if there are blockages or abnormal placement of blood vessels, which may mean that a tumor is present.

Another diagnostic test uses *radioactive isotopes* to find abnormal growths. In these tests, the patient swallows or is injected with a mild radioactive material. Special equipment then tracks the radioactive material, allowing doctors to locate tumors.

Ultrasound is another way to view the inside of the body. In this exam, high-frequency sound waves, which cannot be heard by humans, are directed toward a particular part of the body. These waves echo or bounce off the tissue and organs, and the echo makes pictures on a screen.

Tumors produce different echoes than normal tissues, making it possible to see any abnormal growths.

Sometimes special tests are done to measure substances (tumor markers) that may increase in the blood of a person with cancer. (These same tests may be used later on to find out how the patient is responding to treatment.)

These and other diagnostic tests, including a variety of laboratory tests (such as blood and urine tests), may reveal a tumor. However, the only way to make a definite diagnosis of cancer is by a *biopsy*. For this test, the whole tumor or a piece of it is removed and examined under a microscope to check for cancer cells.

When cancer is diagnosed, the doctor also needs to know the *stage* of the disease. Staging tests tell whether the cancer has spread from its primary site, or starting point, to other parts of the body. Knowing the stage of a cancer helps the doctor plan the best treatment.

Partly because of advances in research, more people are recovering from cancer now than ever before, and new ways to treat the disease are being discovered. Today, nearly half of all cancer patients are being cured because of earlier diagnosis and improved treatment methods.

Treatment Planning

The doctor develops a treatment plan that fits the patient's medical history, age and general health, and the extent and type of cancer. Before starting treatment, the patient may want a second doctor to review the diagnosis and treatment plan. If so, there are a number of ways to get a second opinion:

- The doctor can discuss the patient's case with others who specialize in treating a particular type of cancer. Names of doctors are available from the NCI computer system known as PDQ (Physician Data Query). This system contains up-to-date treatment information for more than 80 types of cancer. (See page 33 for more information about PDQ.)
- Patients can get the names of doctors to consult about their treatment plans from the local medical society, a nearby medical school, or the *Directory of Medical Specialists*, a book available in many libraries.
- The Cancer Information Service, at 1-800-4-CANCER, also may be able to help patients locate doctors to consult for a second opinion.

Informed Consent

When treatment is recommended, most health care facilities require patients to sign a form stating their willingness to proceed. This is to certify that the patient understands what procedures will be done and has agreed to have them performed.

Before agreeing to any treatment, you should ask your doctor for information about:

- The recommended procedure;
- Its purpose;
- Risks and side effects associated with it;
- Likely consequences with and without treatment;
- Other available treatments; and
- Advantages and disadvantages of one treatment over another.

You are likely to discover that your concerns about treatment will decrease as your understanding of cancer and how it is treated increases.

Methods of Treating Cancer

Ways to treat cancer include: *surgery, radiation therapy, chemotherapy, hormone therapy,* and *biological therapy.* The doctor may use one method or a combination of them. The choice of treatment depends on the type of cancer, the location of the tumor, the stage (extent) of the cancer, the patient's age and general health, and a number of other individual factors. A doctor considers all of these items when choosing the best treatment for each patient. In some cases, the patient may be referred to specialists in the different kinds of cancer treatment.

Because cancer can spread, the treatments used against it are very powerful.

It is rarely possible to limit the effects of cancer treatment so that only cancer cells are destroyed. Normal, healthy cells may be damaged at the same time. For this reason, patients may have unpleasant *side effects*. Doctors try to plan treatment to keep side effects to a minimum. Fortunately, most side effects are temporary and go away after treatment ends.

In the following sections, you will find more information about the different types of treatment for cancer.

Surgery

For many types of cancer, surgery is recommended. Surgery is a *local treatment* that removes the tumor and any nearby tissue that may contain cancer cells. Sometimes, healthy tissue may also have to be removed from around the tumor to help keep the cancer from spreading.

When cancer cells spread, they can travel through the bloodstream or the *lymphatic system*. This system carries *lymph fluid* through the body, and it can carry cancer cells as well. Therefore, during surgery doctors often remove *lymph nodes* that are near the tumor to see if they contain cancer cells.

Surgery can cause some side effects, depending on the type of operation, the general health of the patient, and other factors. During the first few days after surgery, patients often have soreness in the wound area. Because some nerves may be cut during surgery, patients also may have some numbness or tingling in the area. These problems usually go away within a few weeks, although some numbness may be permanent. Patients also may feel tired or weak for a while. It takes time to recover from an operation, especially from major

surgery, and this time differs from patient to patient.

Radiation Therapy

In radiation therapy (also called x-ray therapy, radiotherapy, cobalt treatment, or irradiation), high-energy rays are used to damage cancer cells so they are unable to grow and multiply. Like surgery, radiation therapy is a local treatment; it affects only the cells in the treated area. (For some cancers, like *leukemia* and *lymphoma*, the whole body may be radiated.) Radiation therapy may be used before surgery to shrink the tumor or after surgery to destroy any cancer cells that may remain in the area. The two most common types of radiation therapy are *external radiation therapy* and *radiation implants*.

In external radiation therapy, a machine directs high-energy rays at the cancer. Patients usually receive these treatments 5 days a week for several weeks as outpatients (they don't stay in the hospital). Patients who receive external radiation therapy are not radioactive during or after treatment.

Sometimes it is best to put cancer-killing rays as close as possible to the tumor. By using a radiation implant, the doctor can give a higher dose of radiation than is possible with external therapy while sparing most of the healthy tissue around it. For patients having a radiation implant, a small container of radioactive material is placed in the body cavity or directly into the cancer. While the implant is in place, most patients stay in the hospital. The radioactive material in the implant may transmit rays into the area around the patient, so visits and contact with these patients are limited during treatment. Once the implant is removed, no radioactive

material remains in the patient. There is no danger to patients or visitors.

Even though radiation therapy is directed only to the area where treatment is needed, it can cause side effects. Most of the side effects that occur, although unpleasant, are not permanent. The most common side effects of radiation therapy are unusual tiredness and skin reactions (such as rashes or red areas) in the area being treated. Radiation therapy also may cause a decrease in the number of white blood cells, which help to protect the body against infection. The type and degree of side effects depend on the area of the body that is being treated.

Chemotherapy

Treatment with anticancer drugs, called chemotherapy, is used to destroy cancer cells by disrupting their ability to grow and multiply. There are many different drugs used to treat cancer, and they are given to patients in different ways: some are given by mouth; others work better when they are injected into a muscle, a vein, or an artery. Some of these drugs are given in cycles—a treatment period, followed by a rest period, then another treatment period, and so on. Regardless of how it is given, chemotherapy finds its way into the bloodstream and is carried all through the body. Because chemotherapy can act on cells throughout the body, it is called *systemic treatment*.

Depending on the specific drugs the doctor orders, most patients take their chemotherapy as outpatients at a hospital, at the doctor's office, or at home. Sometimes it may be necessary to stay in the hospital so the effects of treatment can be watched.

Chemotherapy works mainly on cancer cells, but it also affects other rapidly growing cells, including hair cells and cells that line the digestive tract. As a result, patients may have side effects such as hair loss, nausea, and vomiting. Most anticancer drugs also affect the *bone marrow*, decreasing its ability to produce blood cells. Therefore, some chemotherapy patients may have a higher risk of getting an infection. The type and degree of side effects depend on the drugs being given, the dosage, the patient's age and general health, and other factors.

Hormone Therapy

Some types of cancer depend on hormones for their growth. For this reason, doctors may recommend therapy that prevents cancer cells from getting the hormones they need to grow. This treatment may include the use of drugs to block the body's production of hormones or surgery to remove hormone-producing organs. Hormone therapy is most often used to treat cancers of the breast, prostate, kidney, and uterus. Commonly used drugs include tamoxifen (for breast cancer), DES or diethylstilbestrol (for breast and prostate cancers), and Megace (for kidney and uterine cancers).

Hormone therapy can cause a number of side effects, depending on the specific drug or surgical procedure. Patients may have nausea and vomiting, swelling, or weight gain. In some cases, the treatment interferes with the body's production or use of hormones. For example, women taking tamoxifen may have some symptoms of menopause, such as hot flashes.

Biological Therapy

Biological therapy (sometimes called *immunotherapy*) is a new area of cancer treatment. Scientists have identified a number of natural and man-made substances that can boost, direct, or restore the body's *immune system*. One form of biological therapy uses monoclonal antibodies, substances that can locate cancer cells and bind to them. Another uses interferon, a substance that stimulates the body's immune system to fight cancer cells. A third uses interleukin-2, a protein that regulates cell growth. Other types of biological therapy are under study also.

Nutrition for Cancer Patients

Eating can be difficult for many cancer patients. Often they have no appetite. Or, the taste of food may change; for example, food—especially meat—may taste bitter or like metal. Also, many patients are weak following treatment and are unable to cook for themselves. Still others feel depressed and have little interest in food.

For whatever reason it occurs, loss of appetite can be a serious problem. Researchers are learning that patients who eat well may be better able to withstand the side effects of treatment. Therefore, nutrition is an important part of each patient's treatment plan, especially having enough protein in the diet to build and repair tissues. Eating well also means getting enough calories to prevent weight loss. Many patients have found that eating several small meals throughout the day works better than eating three large meals.

Doctors, nurses, and dietitians can explain the side effects of cancer treatment and can suggest ways to deal with them. You can get more information on cancer treatment and coping with side effects in other National Cancer Institute publications (see page 36).

Adjusting to the Disease

When people have cancer, life can change for them and for the people who care about them. These changes in daily life can be difficult to handle. When a person finds out he or she has cancer, a number of different and sometimes confusing emotions may appear.

At times, cancer patients and family members may feel depressed, angry, or frightened. At other times, feelings may vary from hope to despair or from courage to fear. These are normal reactions for people dealing with a major change in their lives. Patients usually are better able to cope with their emotions if they can talk openly about their illness and their feelings with family members and friends.

Concerns about the future, as well as about tests, treatment, a hospital stay, or medical bills are common. Talking to doctors, nurses, or other members of the health care team may help to ease fear and confusion. Patients can take an active part in decisions about their medical care by asking questions about their disease and its treatment. Patients and family members often find it helpful to write down questions for the doctor as they think of them. Taking notes during visits to the doctor also can help them remember what was talked

about. Patients should ask their doctor to repeat or fully explain anything that is not clear.

Most patients have important questions to ask about cancer, and their doctor is the best person to provide answers. They usually want to know what kind of cancer they have, how it can be treated, and how successful the treatment is likely to be. The following are some other questions that patients and family members might want to ask the doctor:

- What are the benefits of treatment?
- What are the risks and side effects of treatment?
- Is it possible to keep working?
- Will changes in normal activities be required?
- How often are checkups needed?
- How much will the treatment cost?

Many cancer patients become concerned, especially after surgery, that the changes to their bodies will affect how they look and how others will react to them. They may worry that they can no longer hold a job or care for their family. Concerns about sexuality also can be upsetting.

The patient's doctor is the best person to give advice about working or limiting other activities, but it may be hard to talk to the doctor about feelings and other very personal matters. Many patients find it helpful to talk with others who are facing similar problems. This kind of help is available through cancer-related support groups, such as those described in the next section. If the emotional problems of the patient or family become too hard to handle, a mental health counselor may be able to help.

Living with any serious disease can be difficult. The public library is a good source for books and articles on cancer. Cancer patients and their families can find additional suggestions about living with cancer in other NCI booklets (see page 36).

Support for Cancer Patients

Adapting to the changes that come from having cancer is easier for both patients and their families when they get helpful information and support services. Often, the social services office at the hospital can suggest agencies that will help with rehabilitation, emotional support, financial aid, transportation, or home care. Also, the American Cancer Society (ACS) provides patient services and education. Local offices of the ACS are listed in the telephone book under American Cancer Society, Inc.

Information about other resources and services is available through the Cancer Information Service, at 1-800-4-CANCER.

What the Future Holds

There are more than 5 million Americans living today who have had some type of cancer. The outlook for each patient depends on the type of cancer and the stage of the disease, as well as the patient's age, general health, response to treatment, and other factors. Researchers are working to find better ways to treat cancer, and the chances of recovering are improving.

Doctors usually talk about "surviving" cancer, or they may use the term "*remission*" rather than "*cure*." Even though many patients recover completely, doctors use these terms because cancer may show up again at a later time. The doctor will want to watch the cancer patient closely to be sure that the cancer has not returned. For most forms of cancer, 5 years without symptoms is when a patient is considered "cured."

It is natural to be concerned about the future. Patients often use statistics they have heard about to figure out their own chances of being cured. However, statistics describe averages based on many, many people. No two cancer patients are alike. Only a patient's doctor knows enough about that person's case to discuss the course of the disease.

Cancer Research

Scientists at hospitals and medical centers across the country are studying the causes, prevention, diagnosis, and treatment of cancer.

Causes and Prevention of Cancer

Doctors can seldom explain why one person gets cancer and another doesn't. It is clear, however, that cancer is *not* caused by an injury, such as a bump or bruise, to the body. And cancer is *not* contagious. No one can "catch" cancer from another person.

Researchers study patterns of cancer in the U.S. population to find out why some people are more likely to develop certain cancers and what things in our sur-

roundings and lifestyles may cause cancer. From these studies, we know that people of all ages get cancer, but it is more common in middle-aged and elderly people. According to present rates, 73 million Americans who are alive today will eventually develop cancer; this is about 30 percent of the population. Over the years, cancer will occur in approximately three out of every four families.

Overall, the number of new cases of cancer is decreasing among women and increasing in men, with the rate for black men going up faster than for white men. Lung cancer is the leading cause of cancer-related deaths in men; breast cancer and lung cancer are the leading causes for women.

Many experts believe that people get cancer through repeated and long-term contact with cancer-causing agents, called *carcinogens*. Some people are more sensitive to carcinogens than others and, therefore, are more likely to get cancer. Scientists believe that most cancers are caused in two steps by two kinds of agents: initiators and promoters.

- Initiators start the damage to a cell that can lead to cancer. For example, cigarette smoking has been shown to be an initiator.
- Promoters usually do not cause cancer by themselves. They change cells already damaged by an initiator from normal to cancer cells. For example, studies show that alcohol promotes the development of cancer in the mouth when combined with an initiator, such as tobacco.

Scientists have also discovered many *risk factors* that increase our chances of getting cancer. About 80 percent of all cancers may

be related to the things we eat, drink, and smoke, as well as the environment and workplace. Other risk factors, such as genetics, are unavoidable. In the next sections, you will find more information about risks that are related to getting cancer.

Risks You Can Avoid

By choosing a lifestyle that avoids certain risks, you can help protect yourself from developing cancer. Many cancers are linked to factors that you can control.

- Tobacco—Smoking and using tobacco in any form has been directly linked to cancer. Overall, smoking causes 30 percent of all cancer deaths. The risk of developing lung cancer is 10 times greater for smokers than for nonsmokers. The amount of risk from smoking depends on the number and type of cigarettes you smoke, how long you have been smoking, and how deeply you inhale. Smokers are also more likely to develop cancers of the mouth, throat, *esophagus*, pancreas, and bladder. And now there is emerging evidence that smoking can also cause cancer of the stomach and cervix.

  The use of "smokeless" tobacco (chewing tobacco and oral snuff) increases the risk of cancer of the mouth and *pharynx*. Once you quit smoking or using smokeless tobacco, your risk of developing cancer begins to decrease right away.

- Diet—What you eat may affect your chances of developing cancer. Scientists think there is a link between a high-fat diet and some cancers, particularly those of the breast, colon, *endometrium*, and prostate. Obesity is thought to be linked with increased death rates for cancers of the prostate, pancreas, breast, and

ovary. Still other studies point to an increased risk of getting stomach cancer for those who frequently eat pickled, cured, and smoked foods. The NCI believes that eating a well-balanced diet can reduce the risk of getting cancer. Americans should eat more high-fiber foods (such as whole-grain cereals and fruits and vegetables) and less fatty foods.

- Sunlight—Repeated exposure to sunlight increases the risk of skin cancer, especially if you have fair skin or freckle easily. In fact, ultraviolet radiation from the sun is the main cause of skin cancer, which is the most common cancer in the United States. Ultraviolet rays are strongest from 11 a.m. to 2 p.m. during the summer, so that is when risk is greatest. Protective clothing, such as a hat and long sleeves, can help block out the sun's harmful rays. You can also use sunscreens to help protect yourself. Sunscreens with a number 15 on the label means most of the sun's harmful rays will be blocked out.
- Alcohol—Drinking large amounts of alcohol (one or two drinks a day is considered moderate) is associated with cancers of the mouth, throat, esophagus, and liver. People who smoke cigarettes and drink alcohol have an especially high risk of getting cancers of the mouth and esophagus.
- X-rays—Large doses of radiation increase cancer risk. Although individual x-rays expose you to very little radiation, repeated exposure can be harmful. Therefore, it is a good idea to avoid unnecessary x-rays. It's best to talk about the need for each x-ray with your doctor or dentist. If you do need an x-ray,

ask if shields can be used to protect other parts of your body.

- Industrial Agents and Chemicals—Being exposed to some industrial agents or chemicals increases cancer risk. Industrial agents cause damage by acting alone or together with another cancer-causing agent found in the workplace or with cigarette smoke. For example, inhaling asbestos fibers increases the risk of lung disease and cancer. This risk is especially high for workers who smoke. You should follow work and safety rules to avoid coming in contact with such dangerous materials.

  Being exposed to large amounts of household solvent cleaners, cleaning fluids, and paint thinners should be avoided. Some chemicals are especially dangerous if inhaled in high concentrations, particularly in areas that are not well ventilated. In addition, inhaling or swallowing lawn and garden chemicals increases cancer risk. Follow label instructions carefully when using pesticides, fungicides, and other chemicals. Such chemicals should not come in contact with toys or other household items.

- Hormones—Taking *estrogen* to relieve menopausal symptoms (such as hot flashes) has been associated with higher-than-average rates of cancer of the uterus. Numerous studies also have examined the relationship between oral contraceptives (the pill) and a variety of female cancers. Recent studies report that taking the pill does not increase a woman's chance of getting breast cancer. Also, pill users appear to have a lower-than-average risk of cancers of the endometrium and ovary. However, some researchers believe that there may be

a higher risk of cancer of the cervix among pill users. Women taking hormones (either estrogens or oral contraceptives) should discuss the benefits and risks with their doctor.

Unavoidable Risks

Certain risk factors for cancer cannot be controlled, but people at high risk can help protect themselves by getting regular checkups. Some groups that have a higher-than-average risk of developing cancer are described below.

- Individuals who have close relatives with *melanoma* or cancer of the breast or colon. A small number of these cancers tends to occur more often in some families. If a close relative has been affected by one of these cancers, you should tell your doctor and be sure to have regular checkups to detect early problems.
- Persons who have had x-ray treatment to the head or neck when they were children or young adults. Exposure to these x-ray treatments may result in *thyroid* tumors, which have been associated with radiation given for an enlarged *thymus* gland, enlarged tonsils and *adenoids*, whooping cough, ringworm of the scalp, acne, and other head and neck conditions. Most thyroid tumors are not cancer. If thyroid cancer does develop, it usually can be cured. If you have had such x-rays, you should have a doctor examine your throat and neck every 1 or 2 years.
- Daughters and sons whose mothers took a drug called diethylstilbestrol (DES) to prevent miscarriages while they were pregnant with them. DES and some sim-

ilar drugs given to mothers during pregnancy have been linked to certain unusual tissue formations in the vagina and cervix of their daughters. DES also has caused a rare type of vaginal and cervical cancer in a small number of exposed daughters. Women who took DES and DES-type drugs during pregnancy may themselves have a moderately increased risk of developing breast cancer. DES-exposed daughters and mothers should have examinations at least once a year that include pelvic and breast exams and Pap tests.

No link with cancer due to DES exposure before birth has been found in boys and men. However, there may be an increase in certain reproductive and urinary system problems in DES-exposed sons, who should also be examined regularly by a doctor.

Advances in Treatment

Improved methods of treating cancer have helped to increase survival rates for cancer patients. The National Cancer Institute supports numerous studies to develop and improve all forms of cancer therapy. These studies range from experiments on cells in the laboratory, to those using animals, to others that include large numbers of cancer patients in clinical trials.

Clinical trials are done with the cooperation of cancer patients and are designed to answer scientific questions and to find out if a promising new treatment is both safe and effective. Patients who take part in research make an important contribution to medical science and may have the first chance to benefit from improved treatment methods. Cancer patients who are con-

sidering participating in a clinical trial should discuss their interest with their doctor.

Doctors can learn about clinical trials by using PDQ (Physician Data Query), a computerized system developed by the NCI. To obtain information from PDQ, doctors can use an office computer or the services of a medical library. Most Cancer Information Service offices provide PDQ searches to physicians and can tell doctors how to use the system. Information about current research also is available to patients through the CIS.

Adenoids (AD-a-noids): Masses of lymphatic tissue behind the nose. If enlarged, they may obstruct breathing.

Angiogram (AN-je-o-gram): An x-ray of the blood vessels.

Benign tumor (bee-NINE): A growth that is not cancer and does not spread to other parts of the body.

Biological therapy: A treatment that uses the body's natural immune system to fight disease.

Biopsy (BY-op-see): The removal of a sample of tissue and examination of it under the microscope to see if cancer cells are present.

Bladder: The body's reservoir for urine. It is located in front of the rectum.

Bone marrow: Spongy tissue in the center of the large bones that makes blood cells.

Cancer: A general term for more than 100 diseases where abnormal cells grow and divide without any order. Cancer cells can spread through the bloodstream or lymphatic system to start new cancers in other parts of the body.

Carcinogen (kar-sin-O-gin): Any agent that is known to cause cancer.

Cervix: The lower, narrow end of the uterus.

Chemotherapy (kee-mo-THER-a-pee): Treatment with anticancer drugs.

Colon: The lower 5 to 6 feet of the intestine. Also called the large bowel.

Computed tomography (tom-OG-rah-fee): An x-ray test that uses a computer to produce a detailed picture of a cross-section of the body. Also called CT or CAT scan.

Endometrium (en-do-ME-tree-um): The lining of the uterus.

Esophagus (e-SOF-a-gus): The tubelike passageway that carries food from the throat to the stomach.

Estrogen (ES-tro-gin): One of several female sex hormones.

External radiation therapy: A type of cancer treatment that uses a machine to focus high-energy rays on the cancer site.

Hormone therapy: Treatment of cancer by removing or adding hormones.

Immune system: The complex group of cells and organs that defend the body from foreign substances that might cause infection or disease.

Immunotherapy (IM-yoo-no-THER-a-pee): See Biological therapy.

Larynx (LAR-inks): The upper part of the windpipe. The larynx produces the voice and is also called the voice box.

Leukemia (lu-KEE-me-ah): A cancer of the blood-forming organs (bone marrow, spleen).

Local treatment: Treatment that affects cells in the tumor and the area close to it.

Lymph fluid (limf): A nearly colorless fluid that flows throughout the lymphatic system. This fluid bathes the body's tissues and helps fight infection.

Lymph nodes: Small, bean-shaped structures located along the lymphatic system. Lymph nodes act as filters, collecting bacteria or cancer cells that may travel through the lymphatic system; also called lymph glands.

Lymphatic system (lim-FAT-ik): The lymph nodes, spleen, and thymus—which produce and store infection-fighting cells—and the network of channels that carry lymph fluid.

Lymphoma (lim-FO-ma): Cancer that begins in the lymphatic system.

Malignant (ma-LIG-nunt): Cancerous (see CANCER).

Mammogram (MAM-o-gram): An x-ray of the breast.

Melanoma: A rare type of cancer of the cells that produce melanin (pigment in the skin). Melanoma usually begins in the skin, often as a mole that is dark in color. Unlike the common skin cancers, melanoma tends to spread to internal organs.

Menopause: The time in a woman's life when regular menstruation permanently stops, usually between the ages of 45 and 55; also called "change of life."

Metastasis (me-TAS-ta-sis): The spread of cancer from the original tumor to another part of the body. Cells in the metastatic tumor (secondary tumor) are the same as those in the original cancer.

Ovary: The female reproductive organ in which eggs are formed. The female hormone estrogen also comes from this organ.

Pancreas: An organ of the digestive system located behind the stomach. The pancreas secretes chemicals that help digest food. It also secretes insulin, which changes blood sugar into sources of quick energy.

Pap test: A method for examining cells taken from the cervix and vagina; also called a Pap smear. This test can detect cancer of the cervix and cell changes that may precede that type of cancer.

Pelvis: The lower part of the abdomen located between the hip bones.

Pharynx (FAR-inks): The throat; specifically, the upper part of the throat just behind the mouth.

Polyp (POL-ip): A growth of mucous membrane that bulges into a cavity of the body, such as the colon or nose.

Precancerous (pre-KAN-sir-us): A term used to describe a condition that may or is likely to become cancer.

Prostate: A gland of the male reproductive system that lies just below the bladder and surrounds part of the canal that empties the bladder.

Radiation implant: A small container of radioactive material that is placed in or near a cancer.

Radiation therapy (ray-dee-AY-shun): Treatment with high-energy rays from x-rays or other sources of radiation.

Radioactive isotopes (ray-dee-O-ak-tiv I-sa-towps): Substances that give off radiation. Used in small amounts to diagnose cancer.

Rectum: The last 5 to 6 inches of the colon, leading to the outside of the body.

Remission: The temporary or permanent disappearance of cancer symptoms. When this happens, the patient is said to be "in remission."

Risk factor: Something that increases a person's chances of getting a particular type of cancer.

Screening: Using tests to find disease when there are no symptoms.

Scrotum (SKRO-tum): The pouch that contains the testicles.

Side effects: Problems caused when cancer treatment affects healthy cells in the body. Common side effects are fatigue, nausea, vomiting, decreased blood cell counts, and mouth sores.

Sigmoidoscope (sig-MOY-da-skope): A tubelike instrument used to examine part of the colon.

Stage: The extent of disease; how doctors classify whether cancer has spread from its original site to another part of the body.

Stool: The matter discharged in a bowel movement.

Surgery: An operation.

Systemic treatment (sis-TEM-ik): Treatment that reaches and affects cells everywhere in the body (such as chemotherapy, hormone therapy, and biological therapy).

Testicles (TESS-tee-kuls): The two egg-shaped glands that are located in the scrotum. Also called the testes, these glands are part of the male reproductive system and secrete male hormones.

Thymus gland: An organ located behind the breast bone. It is largest during the first months of life, then shrinks and is very small in adults. This gland is essential in the development of the immune system, the body's defense against disease.

Thyroid gland: A gland that produces hormones responsible for growth and metabolism. It is located near the upper part of the trachea (windpipe).

Tumor: An abnormal mass of tissue that results from excessive cell division. Tumors perform no useful body function. They may be either benign (not cancer) or malignant (cancer).

Ultrasound: A method to diagnose disease that bounces high-frequency sound waves off tissue and changes the echoes into pictures.

Uterus: The hollow organ in which the unborn child develops until birth; also called the womb.

Vagina: The muscular canal that leads from the uterus to the outside of the body; also called the birth canal.

X-rays: High-energy radiation used in low doses to diagnose disease or injury and in high doses to treat cancer.

General information about cancer and its treatment is widely available. You may find some of the following resources helpful. You also may wish to check your local library and to contact support groups in your community.

Cancer Information Service
1-800-4-CANCER

In Hawaii, on Oahu, call 524-1234 (call collect from neighboring islands).

The NCI-supported Cancer Information Service is a nationwide telephone service that answers questions from cancer patients and their families, health care professionals, and the public. Information specialists can provide information and publications on all aspects of cancer. They also may know about cancer-related services in local areas. Spanish-speaking staff members are available to callers from the following areas (daytime hours only): Florida, California, Georgia, Illinois, New Jersey (area code 201), New York, and Texas. By dialing the CIS number, you will be connected to the CIS office serving your area.

PDQ
The National Cancer Institute computerized system known as PDQ (Physician Data Query) is designed to give doctors quick and easy access to:

- the latest treatment information for most types of cancer;
- descriptions of clinical trials that are open for patient entry; and

- names of organizations and physicians involved in cancer care.

To get access to PDQ, a doctor may use an office computer with a telephone hookup and a PDQ access code or the services of a medical library with online searching capability.

American Cancer Society
1599 Clifton Road, NE
Atlanta, GA 30329
(404) 320-3333

The American Cancer Society (ACS) is a voluntary organization that offers a variety of services to cancer patients and their families. The ACS also is involved in cancer education and research. You can get additional information about ACS programs and services from the national headquarters or a local chapter (listed in the telephone book under American Cancer Society).

Candlelighters Childhood Cancer Foundation
1901 Pennsylvania Ave., NW
Suite 1001
Washington, DC 20006
(202) 659-5136

Candlelighters is an organization formed by parents of young cancer patients. It helps families of pediatric and adolescent cancer patients cope with the emotional stresses of their experience. Candlelighters hold regular meetings to discuss problems and exchange information. In addition, the organization works to gain support for programs of cancer research and to stimulate local interest in the special concerns of pediatric and adolescent cancer patients and their families.

Leukemia Society of America
733 Third Avenue
New York, NY 10017
(212) 573-8484

The Leukemia Society of America (LSA) is a voluntary health organization that offers patients with leukemia and related disorders financial assistance, transportation, and consultation services for referrals. You can get additional information about LSA programs and services from the national headquarters or a local chapter (listed in the telephone book).

American Red Cross
421 18th Street, NW
Washington, DC 20006
(202) 737-8300

The American Red Cross is a network of local chapters that provides health education materials and programs, including courses designed to give individuals the skills needed to care for ill family members.

Make Today Count
101½ South Union Street
Alexandria, VA 22314
(703) 548-9674

Make Today Count is an organization that helps patients and their families cope with cancer and other serious diseases and improve their quality of life.

For Further Information

The NCI has printed materials that are available to cancer patients, their families, and the public. These publications are about the various types of cancer, their treatment, and living with the disease. They are available free of charge by calling the Cancer Information Service at 1-800-4-CANCER or by writing:

Office of Cancer Communications
National Cancer Institute
Building 31, Room 10A24
Bethesda, MD 20892

Cancer Prevention

- Diet, Nutrition, and Cancer Prevention: The Good News
- Good News, Better News, Best News... Cancer Prevention

Early Detection

- Testicular Self-Examination
- Questions and Answers About Breast Lumps
- Questions and Answers About DES Exposure During Pregnancy and Before Birth

Specific Types of Cancer

The "What You Need To Know About Cancer" series includes pamphlets about the symptoms, diagnosis, treatment, rehabilitation, and emotional issues associated with specific types of cancer:

- Bladder
- Bone
- Brain
- Breast
- Cervix
- Colon and Rectum
- Esophagus
- Hodgkin's Disease
- Kidney
- Larynx
- Leukemia (Adult and Childhood)
- Liver
- Lung
- Melanoma
- Mouth
- Multiple Myeloma
- Non-Hodgkin's Lymphomas
- Ovary
- Pancreas
- Prostate
- Skin
- Stomach
- Testis
- Uterus
- Wilms' Tumor

The "Research Report" series includes in-depth reports covering current research on the causes and prevention, symptoms, detection and diagnosis, and treatment of various types of cancer:

- Bone Cancers and Other Sarcomas
- Bone Marrow Transplantation
- Cancer of the Bladder

- Cancer of the Colon and Rectum
- Cancer of the Adult Kidney and Wilms' Tumor
- Cancer of the Lung
- Cancer of the Pancreas
- Cancer of the Prostate
- Cancer of the Stomach
- Cancer of the Uterus
- Hodgkin's Disease and Non-Hodgkin's Lymphomas
- Leukemia
- Melanoma
- Mesothelioma
- Nonmelanoma Skin Cancer
- Oral Cancers
- Testicular Cancer

Cancer Treatment

- Chemotherapy and You
- Eating Hints
- Radiation Therapy and You
- Questions and Answers About Pain Control
- What are Clinical Trials All About?

Advanced Disease

- Advanced Cancer: Living Each Day
- Answers to Your Questions About Metastatic Cancer
- When Cancer Recurs: Meeting the Challenge Again

Living with Cancer

- Taking Time: Support for People with Cancer and the People Who Care About Them
- Talking with Your Child About Cancer (for parents whose child has cancer)
- When Someone in Your Family Has Cancer (for young people whose parent or sibling has cancer)

NATIONAL CANCER INSTITUTE

NIH Publication No. 90-1566
Revised August 1988
Reprinted November 1989